

Humboldt Kolleg

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Global Challenges of the 21st Century

- 1) Technological development and human health/ quality of life*
- 2) Climate change and environmental sustainability*
- 3) Democracy and cohesion in Europe*

A Reliable Technology for Advanced SiC-MOS Devices Based on Fabrication of High Quality Silicon Oxide Layers by Converting a-Si

An alternative technological approach is proposed to obtain a SiO₂ film on SiC using processes that finally reduce the effective fabrication costs. Accordingly, a high-quality oxide on 4H-SiC substrate using a process flow that consists in a preliminary deposition by sputtering, at room temperature, of an amorphous Si thin layer, followed by its oxidation at a relative low temperature (1100 °C) for SiC MOS technology is reported. The X-ray reflectivity measurements demonstrated that the resulted oxide has a comparable roughness with the one thermally grown and presents the advantage of an almost threefold thinner interfacial layer. The improvement of the oxide/semiconductor interface was further validated by the electrical investigation of the fabricated MOS structures, where a significant diminishing of the effective oxide charge density, interface traps density, and near interface oxide traps density was assessed. Thus, it was demonstrated that, for a specified thickness of the oxide layer on SiC, the proposed technological flow not only significantly reduces the standard duration of the process necessary and consequently the associated fabrication cost, but, more important, leads to superior oxides and interfaces, in terms of both micro-physical and electrical properties.

Razvan Pascu received his B.Sc. from the Faculty of Electronics, Telecommunications and Information Technology, of the Politehnica University of Bucharest in 2010, his M.Sc. in microsystems in 2012, and his Ph.D. in electrical engineering in 2015, also at the Politehnica University of Bucharest, with thesis entitled "SiC sensors for harsh environments: Models and technologies." In 2010, he joined IMT Bucharest. His research activities are focused on fabrication and characterization of silicon and silicon carbide-based devices and they include design and micro-fabrication of the electronic devices,

electrical characterization, and data processing. He became a Romanian Young Academy (RYA) member in 2020.